

**William G. Ball, P.E.**  
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FEB 13 1991

Federal Communications Commission  
Office of the Secretary

**ORIGINAL  
FILE**

February 13, 1991

Ms. Donna R. Searcy  
Secretary  
Federal Communications Commission  
1919 M Street, N. W.  
Room 222  
Washington, DC 20554


Re: Rulemaking RM-7594 Amendment of the Commission's Rules  
Regarding AM Directional Antenna Performance Verification

Dear Ms. Searcy:

On behalf of myself, there are enclosed for filing with the Commission, an original and nine copies of comments in the proceeding mentioned above.

If there are any questions in connection with the foregoing, please contact me.

Sincerely,



William G. Ball

WB/bb  
Enclosures

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FEB 13 1991

Before the  
**Federal Communications Commission**  
Washington, D. C. 20554

Federal Communications Commission  
Office of the Secretary

In the Matter of

Amendment of the )  
Commission's Rules )  
Regarding AM )  
Directional Antenna )  
Performance Verification )

RM - 7594

I am a Consulting Radio Engineer with offices in Manassas Park, Virginia. My education and qualifications are a matter of record with the Federal Communications Commission. I am a Registered Professional Engineer in the Commonwealth of Virginia, Registration No. 9174 and in the State of Ohio, Registration No. 44778.

The Commission has requested comments in the above Rulemaking proceeding to enable them to assess if there is any interest in the proposal filed jointly by the firms of duTreil, Lundin & Rackley, Inc., Lahm, Suffa & Cavell, Inc., Moffet, Larson & Johnson, Inc., and Silliman and Silliman (the Petitioners) requesting , (1) a review of the pertinence of the present regulations concerning AM directional antenna performance verification, given the significant environmental, technological, and economic changes which have occurred since the present policies and rules were adopted; (2) to determine whether the present, complicated and costly regulations ensure freedom from interstation interference, particularly at night; and (3) to consider the adoption of simpler, less expensive regulatory means made possible by advances in antenna analysis

methods and instrumentation technology.

The Petitioners state that though substantial changes in technology have occurred in the past 51 years<sup>1</sup>, no major regulatory changes have taken place to take advantage of these changes. Having been active in the Broadcast field since 1957 and in the field of consulting since 1969, I have noticed many technological changes which affect the AM Broadcaster. Most AM

the firm I was employed by was the performance of the phasing and coupling equipment at carrier frequency. It appears that today in spite of the relative ease of performing circuit analysis on the system, the basic methods and components used in antenna systems have not changed significantly over the years.

The Petitioners state that "Improvements in electronic technology permit more accurate measurement of important internal operating conditions of antenna systems, which was not practical when many of the present rules were adopted."<sup>2</sup> That we can measure more accurately currents and voltages in an antenna system is not a significant question here. The real question becomes, does what we are more accurately measuring truly reflect the actual operating conditions of the antenna system. The Petitioners point out that radio frequency current sensing and metering has been improved by the development of toroidal samplers and electronic meters. They also correctly point out that "great strides" have been made in the accuracy and stability of the antenna monitoring equipment since

antenna arrays on towers of any electrical height<sup>3</sup>, the debate continues among engineers regarding the validity of the current sampled by toroidal samplers at the base of broadcast radiators, especially tall radiators, and whether they correctly indicate the actual current flowing on the tower

I believe that there is merit to the instant proposal, however if the Commission is to pursue its goal of AM improvement, it is mandatory to establish what constitutes a accurate, acceptable sampling system before modifying or relaxing the rules.

The Petitioners also mention the problem of urbanization of the area surrounding transmitter sites and the introduction of reradiating objects in the environment of the station. They argue that adjusting the array to the theoretical parameters may provide better co-channel station protection than by adjusting the antenna system to produced a pattern contained inside the standard pattern. Theoretically, if there is a source of reradiation, it too will have a vertical component which will add vectorially with the components from the elements of the array to establish the final vertical pattern field. If the magnitude of the reradiated component is great enough, the actual total vertical radiation may exceed the standard pattern value. It would be expected that this would likely occur in the region of the pattern minima, which are normally in the direction of other co-channel stations. The proponents have failed to take account of the problem caused by reradiators. Numerous articles have appeared in IEEE publications and elsewhere addressing this problem and its solution by application of moment method programs. The question remains, how do we then determine whether an array is subject to the effects of reradiating sources? Any inquiry should address this problem,

Comments of William G. Ball  
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especially that of known potential sources of reradiation such as  
water towers, power transmission lines etc. Taking these items

Missouri, 1010 khz - 50 kW -DA-D<sup>4</sup>. It should be noted that while agreement was good, when expressed as a percentage, there were differences greater than 25% in many instances. Whether these differences were due to error in the computer model, error induced in the system by making the measurements and the accuracy of the



adjusting the phasing equipment to produce currents and phases as calculated by a moment methods program. One recent attempt to apply moment method calculations to diplexed arrays and adjust the phasing systems to produce the authorized patterns when fed by currents of the magnitude and phase calculated by the moments method program hit a snag as the program failed to account for the capacitance to ground of the filters (traps) installed between the antennas and the antenna tuning units. This capacitance was of such a magnitude that a field modification of the phasing and coupling was necessary to finally produce the proper patterns when tuned in the field. This type of problem must be addressed in any rule making proposed by the Commission if the integrity of the AM broadcast band is to be preserved or improved.

Finally, it needs to be pointed out that some arrays have never been able to be adjusted as designed. An recent example is WJJD, 1160 kHz, Chicago, Illinois. WJJD held a construction permit for nighttime operation utilizing a four tower directional antenna system and a power of 10 kilowatts. The antenna system was designed to afford full protection to the secondary 0.5 mV/m, 50% skywave contour of cochannel Class IA station KSL in Salt Lake City, Utah. For whatever reason, it was not possible to prove the antenna system adjustment, and WJJD applied for a modification of facilities to reduce night power to five kilowatts. The array was subsequently proven in adjustment at 5 kilowatts. If all one had

to do to prove the adjustment of the array was tune it in to a set of parameters on the phase monitor, WJJD could have been on the air with 10 kilowatts, in spite of the fact that measurements apparently showed it exceeding the standard pattern in several directions.

In conclusion, the Petitioners have raised several questions which I believe the Commission should investigate. It behooves the Commission and private engineers to employ state-of-the-art technology to the maximum degree practical. This is what the Petitioners desire and a policy which I support. However, in order to implement the use of the technology, it must be properly applied to achieve the goals desired. There is a need to develop a record looking towards the improvement of AM antenna system design, implementation, and ultimate adjustment. I support the implementation of a rulemaking proceeding looking forward to these goals.

11 February 1991

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Respectfully Submitted

  
William G. Ball